



A.D. 1856 N° 163.

S P E C I F I C A T I O N

OF

JEAN BAPTISTE PIERRE ALFRED
THIERRY, JUNIOR, JEAN LOUIS RICHARD,
AND BARON HENRY DE MARTINY.

FURNACES, &c.

L O N D O N :

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Furnaces, &c.

LETTERS PATENT to Jean Baptiste Pierre Alfred Thierry, junior, Jean Louis Richard, both of Paris, Chemists, and Baron Henry de Martiny, of Versailles, (France), for the Invention of "**IMPROVEMENTS IN PREVENTING SMOKE BY MEANS OF A FUMIVORE HYGIENIC APPARATUS.**"

Sealed the 4th July 1856, and dated the 22nd January 1856.

PROVISIONAL SPECIFICATION left by the said Jean Baptiste Pierre Alfred Thierry, junior, Jean Louis Richard, and Baron Henry de Martiny, at the Office of the Commissioners of Patents, with his Petition, on the 22nd January 1856.

5 We, JEAN BAPTISTE PIERRE ALFRED THIERRY, junior, JEAN LOUIS RICHARD, both of Paris, Chemists, and Baron HENRY DE MARTINY, of Versailles (France), do hereby declare the nature of the said Invention for **IMPROVEMENTS IN PREVENTING SMOKE BY MEANS OF A FUMIVORE HYGIENIC APPARATUS**, to be as follows:—

10 The annexed Drawing represents a vertical and longitudinal section of a steam boiler furnace. Our system is applicable to all descriptions of furnaces, whether for industrial, for domestic, or culinary purposes.

It consists 1°. In putting under steam boilers, or in the interior of the furnace or fire-place a metallic tubular apparatus, which we call the worm, and 15 which we adapt in the most convenient manner to the furnace.

2°. In injecting surcharged or superheated steam in the midst of the burning materials in the furnace through small perforations made on the worm, so that

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this superheated steam may come in contact with the hydro carbons resulting from the combustion of the fuel, and at the moment of their formation.

3°. In feeding this worm, when in operation, either with superheated steam from the boiler, or with the waste steam from the machine, if the apparatus is applied to a steam engine. 5

4°. In establishing under the grate, or, if necessary, within the furnace or fire-place a second tubular apparatus of the same kind for the purpose of producing a blast of superheated steam therein, a process which allows the furnace to burn without admitting the external atmospheric air, and which enables us to dispense with the tall chimneys used in factories. 10

5°. In employing a reservoir in which the exit steam is received as it issues from the cylinder, and from which reservoir it is conveyed to the worm by means of various junction tubes.

6°. In causing a stream of superheated steam to be discharged into the aforesaid reservoir, for the purpose of increasing the heat of the waste steam, 15 and of giving it a greater impulse, so that it may be used as a blast.

7°. In admitting either ordinary or superheated steam by means of a third worm, if necessary, into the interior of fire-places, or into vessels containing ignited or molten substances. Where a boiler is not kept, it may be necessary to erect one for the special purpose of the Invention. 20

8°. In lining the interior and exterior of our worms with platinum, in order to prevent their oxydation, wearing out, or destruction.

9°. In conveying a thin stream of water within our worms in a small metallic tube communicating with a reservoir suitably disposed.

10°. Finally, our apparatus may be composed of all the organs or arrange- 25 ments here above mentioned, or of only some of them, according to the use for which it is intended.

Schedule.—A, main steam boiler; B, generator; M, brickwork; D, flue or chimney; F, fire-place; H, ash-pit; A¹, steam reservoir; *t*, tube, conveying the steam to the tube *t*¹ under the generator; this tube enters the fire chamber 30 at B¹; *s*, tube, conveying the steam from A¹ to the worm S¹ under the grate; this tube enters the fire pit at C. The steam issues out of the worms *t*¹ and *s*¹, through the small perforations *i, i, i, c, c, c*. P, door of the fire-place; O, door of the ash-pit; both of which doors remain closed during the operation.

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SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Jean Baptiste Pierre Alfred Thierry, junior, Jean Louis Richard, and Baron Henry de Martiny in the Great Seal Patent Office on the 22nd July 1856.

5 **TO ALL TO WHOM THESE PRESENTS SHALL COME**, we, JEAN BAPTISTE PIERRE ALFRED THIERRY, junior, JEAN LOUIS RICHARD, both of Paris, Chemists, and Baron HENRY DE MARTINY, of Versailles, France, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters
10 Patent, bearing date the Twenty-second day of January, in the year of our Lord One thousand eight hundred and fifty-six, in the nineteenth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto us, the said Jean Baptiste Pierre Alfred Thierry, junior, Jean Louis Richard, and Baron Henry de Martiny, Her special licence that we, the said Jean Baptiste Pierre
15 Alfred Thierry, junior, Jean Louis Richard, and Baron Henry de Martiny, executors, administrators, and assigns, or such others as we, the said Jean Baptiste Pierre Alfred Thierry, junior, Jean Louis Richard, and Baron Henry de Martiny, our executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the
20 term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for **IMPROVEMENTS IN PREVENTING SMOKE BY MEANS OF A FUMIVORE HYGIENIC APPARATUS**, upon the condition (amongst others) that we, the said Jean Baptiste Pierre Alfred Thierry, junior, Jean
25 Louis Richard, and Baron Henry de Martiny, executors or administrators, by an instrument in writing under our, or their, or one of their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next
30 and immediately after the date of the said Letters Patent.

NOW KNOW YE, that we, the said Jean Baptiste Pierre Alfred Thierry, junior, Jean Louis Richard, and Baron Henry de Martiny, do hereby declare the nature of our said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following
35 statement:—

This Invention consists of an arrangement of apparatus for consuming the smoke arising from the combustion of coal, wood, turf, and other fuel. The apparatus consists of a spiral tube or worm, which is partly carried through

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the furnace, in order that it may become highly heated by the burning fuel. This spiral tube conveys steam from the boiler or steam chest, which becomes highly heated in its passage, and is allowed to escape over the burning fuel through a series of small apertures made in the spiral tube at the front part of the furnace, and also at the back part behind the bridge. By this arrangement, 5 the gaseous matters evolved by the fuel, and which ordinarily pass off in the form of smoke, combine with the superheated steam, which renders them combustibile, thereby preventing the emission of smoke.

But in order that our Invention may be fully understood and carried into effect, we will proceed to describe the Drawing accompanying and 10 forming part of this Specification, referring to the letters and figures marked thereon.

Fig. 1 is a front elevation of the apparatus ; Fig. 2 is a longitudinal section ; Fig. 3, a plan ; and Figs. 4, 5, 6, and 7, views of the spiral coil.

A is the boiler ; B, B, duplex boilers ; C, the furnace ; D, the ash-pit ; E, 15 dome or steam chamber ; F, the cylinder of the steam engine ; G, eduction pipe which conveys the used steam to the condensing vessel S ; H, a pipe for conveying steam to the spiral tube or worm W ; i, a tap or cock for admitting steam to the pipe H ; K, L, is a pipe divided at the lower end into two, as shewn at O, P, and conveys atmospheric air to the ash-pit ; by this arrange- 20 ment the front part of the ash-pit may be closed up, and the admission of air to the furnace regulated at pleasure by a valve or damper fitted in the pipe K, L. The spiral tube or worm W is secured to the brickwork of the furnace by one or more hooks I, as shewn by Fig. 5 ; in fitting these tubes we prefer that the parts marked *f, g, h, i*, be enclosed by the brickwork ; 25 that the parts *a, b, c, d*, be partly enclosed ; and that the branches *b, c, d, f*, and *g, h*, in which a series of small perforations *r, r*, are made, cross the open fire-place. In order to preserve the tube or pipe from the action of the fire, and to prevent its oxydizing, we cover the inside and outside, where necessary, with a flum or coating of platinum, which is deposited either by 30 means of an electro-galvanic battery, or the tube may be coated by any other analagous process. By this means the perforated tubes may be exposed to an intense heat without injury ; another mode of protecting them is to surround them with a coating of fire clay or other fireproof composition ; the interior of the tube being protected by a quantity of fine iron wire, or 35 iron turnings placed in the entrance of the tube, which will absorb the oxygen produced within the red-hot tube. The steam is admitted to the spiral tube W by the tap or cock *i* ; it passes along the tube, receiving additional heat in its passage, which may be increased by the addition of a

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heating chamber T, which is built so as to project into the furnace. The superheated steam issues first from the perforations *r, r*, made in the tube at the back of the fire bridge M, where it ignites the combustible gases which would otherwise pass off through the chimney. A further portion of the steam
5 rushes through the apertures *r, r*, in front of the furnace, passing over the burning fuel, and flashing the combustible gases into flame. The supply of steam for the spiral tube W may be taken either directly from the dome E of the boiler, and conveyed through the pipe H, or the waste steam may be used after its escape from the cylinder F; in this case it is conveyed to a chamber
10 or reservoir R by a pipe V, and from the reservoir by the pipe L to a spiral tube placed in the furnace for the purpose of superheating the steam. From the chamber R, the superheated steam passes to the perforated tube W, by the pipe U, X, H; should there be an overplus of steam, it is permitted to escape into the atmosphere by the pipe V. In some cases it may be desirable
15 to add an additional perforated tube similar to the foregoing, but fitted beneath the grate or fire bars of the furnace, to which steam is conveyed by the pipe *l, m, n, o*; the steam issues from perforations similar to those before described, and passes through the burning fuel, the arrangement serving as a blowing machine to urge the fire when required. By these means the fire may be maintained
20 at the desired degree of intensity, by regulating the velocity of the draught, and thus the lofty shafts hitherto used for the purpose may be dispensed with. In cases where the boiler or boilers in use are not of sufficient capacity to produce the necessary quantity of steam to supply the perforated tube or tubes, we set up a boiler for the purpose in a spot contiguous to the furnace or
25 furnaces, the smoke of which is to be consumed. The apparatus herein-before described may be applied to any description of furnace or fire-place.

Figs. 6 and 7 shew a modification in plan and elevation applicable to the furnaces of tubular boilers either of marine or locomotive engines, the coils of the perforated tubes being disposed one above another, as shewn at Fig. 7, and
30 secured to the sides of the fire box by hollow hooks, through which the water of the boiler circulates, to prevent them being destroyed by the action of the fire. The steam is conveyed to the spiral tube from the dome of the boiler or any other convenient part, and enters the fire box at *a*. W is the water space between the plates A, B, and C, D, of the fire box; the superheated steam
35 escapes from the apertures *r, r*, as before described, in reference to Fig. 3 and 4.

Having described the nature of our Invention, and the manner of carrying the same into practical effect, we wish it to be understood that we do not confine ourselves to the precise arrangement of the details herein-before

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described and shewn, as the same may be varied without departing from the Invention ; but what we claim and desire to secure under the herein-before in part recited Letters Patent is, consuming smoke by means of the apparatus substantially as herein-before described and shewn.

In witness whereof, we, the said Jean Baptiste Pierre Alfred Thierry, 5 junior, Jean Louis Richard, and Baron Henry de Martiny, have hereunto set our hands and seals, this Sixteenth day of July, in the year of our Lord One thousand eight hundred and fifty-six.

J^N B^{TE} P^{RE} A^D THIERRY, FILS. (L.S.)

J. L. RICHARD.

H. DE MARTINY.

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Signed and sealed in presence of

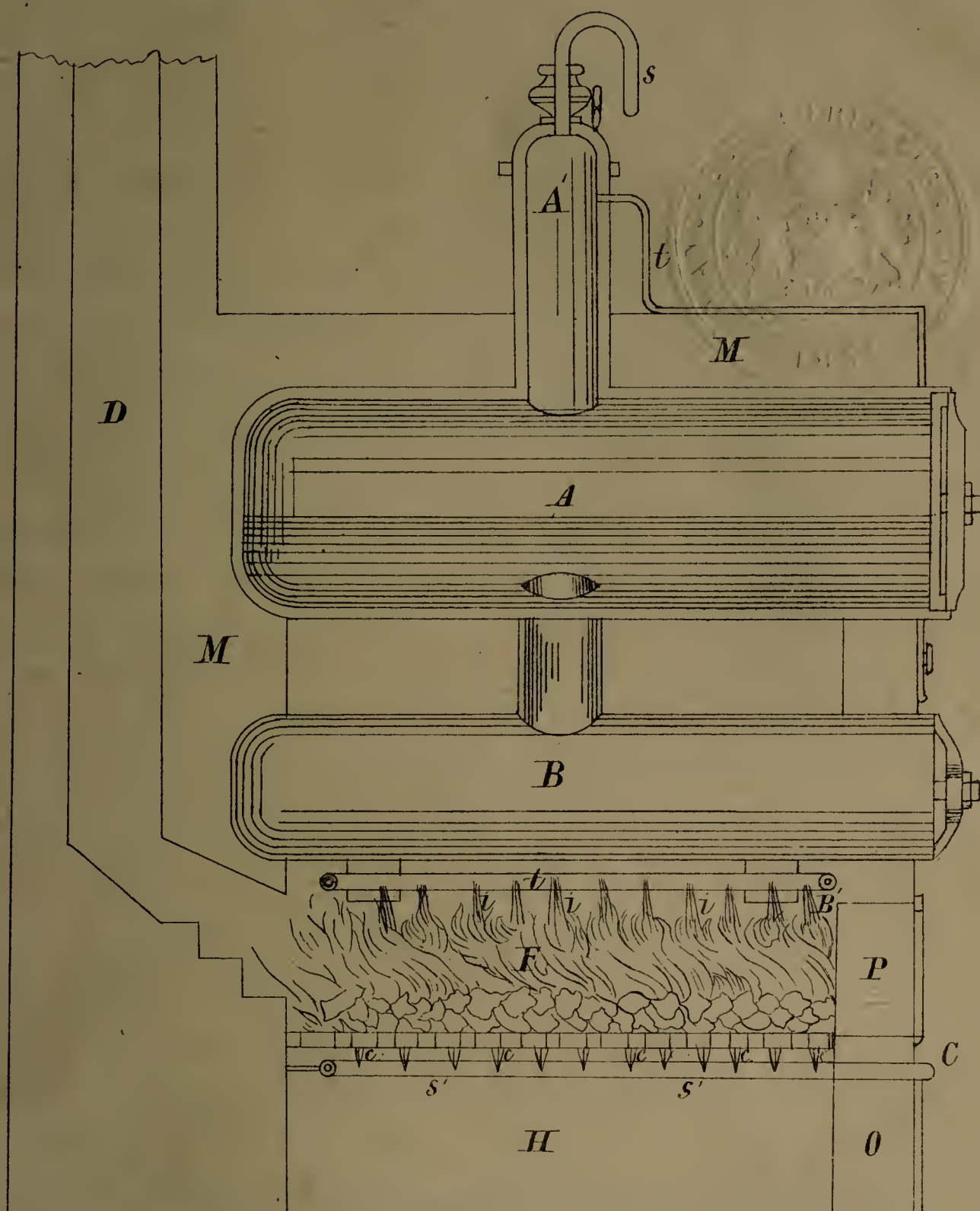
L. D'AUBRÉVILLE,

Civil Engineer.

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THIERRY, RICHARD, & DE MARTINY'S PROVISIONAL SPECIFICATION.



The drawing left with Provisional Specification is partly colored

Drawn on Stone by Malby & Sons .



